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ABSTRACT

Environmental education is a process aimed at producing a citizenry that is knowledgeable concerning the total environment and the role of man, able to participate in activities for maintaining and improving the quality of the environment while meeting human needs and motivated to do so. This guide focuses on the organization and operation of an environmental education program to meet this goal. The guide includes guidelines for developing both the feeling aspect of attitudes, which includes self-image, social responsibility, and environmental appreciation, and the understanding aspects of attitudes which include the natural biophysical environment and man and his relationships with the biophysical environment. The guide outlines environmental education as a process based on three levels of student learning experiences: discovery and inquiry, evaluation and problem identification, and problem solving. A table is included to further illustrate the environmental education process. A listing of areas in the community and on the school site suitable for investigation, suggestions for environmental evaluation and identification of improvement opportunities, and related activities are included in the guide. The guide concludes with curriculum considerations such as the organization and implementation of an environmental education program and teacher in-service workshop. (TK)

SECTION V - G
Dissemination Activities

environmental education program

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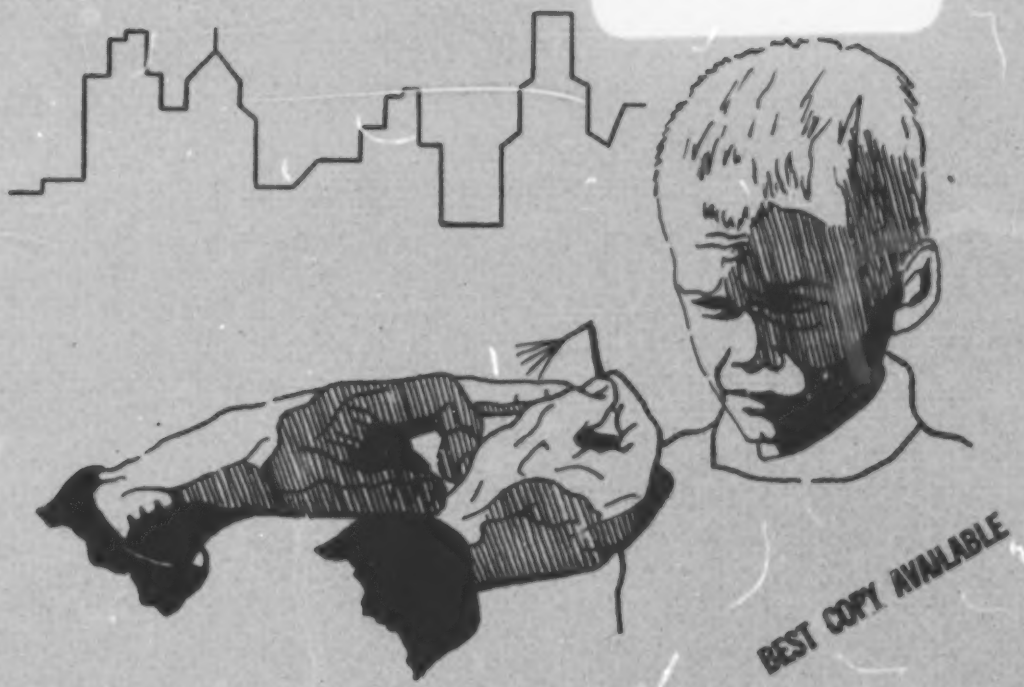

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organization and operation

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ORGANIZATION AND OPERATION OF A K-12 ENVIRONMENTAL EDUCATION PROGRAM

This booklet describes the structure and function of an environmental education program. It has been tried and tested successfully since 1969 in a regional program serving the schools of: Falmouth, Cumberland-North Yarmouth, Freeport, and Yarmouth, Maine.

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1969

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ORGANIZATION AND OPERATION OF AN ENVIRONMENTAL EDUCATION PROGRAM

Major Goal and Definition of Environmental Education

Environmental education is a process aimed at producing a citizenry that is knowledgeable concerning the total environment and the role of man, able to participate in activities for maintaining and improving the quality of the environment while meeting human needs, and motivated to do so.

Its inclusion in the educational curriculum is a response to both a need for educational improvement and a need for citizens who can identify, prevent and resolve problems in the process of maintaining and creating a quality environment. Responsible citizenship is a goal of the school delegated to it by society. Environmental education can contribute in a major way to the achievement of this goal, not by adding a new subject to an already overcrowded curriculum, but by focusing the existing curriculum upon the immediate surroundings of the student and related human processes.

Environmental education attempts to achieve this goal by developing attitudes and values. Strong, rational attitudes are essential in the development of values which will motivate action for participation in the maintenance and improvement of the total environment now and in the future.

From the above goal and definition the following subgoals are identified:

Subgoals of Environmental Education

1. (Affective Subgoal)

   To help individuals acquire strong feelings fundamental to developing a concern for the environment and a motivation to participate in activities for maintaining and improving the quality of the total environment.

2. (Cognitive Subgoal)

   To help individuals acquire basic understandings of the total natural and man-made environment, their relationship with this environment, and common environmental problems.

3. (Behavioral-Skill Subgoal)

   To help individuals develop the necessary thinking and behavioral skills for the prevention of environmental degradation, the correction of environmental abuses, and the alteration and use of natural resources to enhance the function and quality of the environment to meet ecological and human needs.

Developing Values, Attitudes and Behavioral Skills through Environmental Education

The role of the teacher is to develop in each student attitudes and values towards the biophysical environment and its associated problems -- attitudes and values which eventually will lead to the student's involvement in activities which help to maintain and improve a quality environment.

Values are thought to be derived from attitudes. Attitudes are believed to consist of three essential parts or components. Two of these are feelings and understandings. If a student feels strongly enough toward the environment and its problems and possesses a sufficient amount of accurate information about it and how he can help resolve problems, his attitudes may then contain a third component -- a tendency or motivation to act. Environmental education seeks to develop the kind of behavior which helps to improve the quality of the environment.

Developing the Feeling Part of Attitudes

As the student participates in the program, the teacher can help him acquire three basic feelings essential in developing desirable attitudes:

1. Self-Image

   A healthy self-image, a feeling of individual worth and self respect, is essential if each student is to become truly concerned about his environment. He must believe in himself and his own ability.

   Development

   a. Communicate an interest and respect concerning each individual and a belief in his abilities.

   b. Stress the importance of each individual's role in activities and encourage his contribution.

   c. Provide for each individual to achieve a measure of success in the activities he undertakes.

2. Social Responsibility

   Each student must develop a sense of individual and collective responsibility for the maintenance and improvement of the biophysical environment for present and future generations.

   Development

   a. Guide the student in the recognition of biophysical environmental problems, help him to learn why they must be resolved, how to solve or prevent them, and the benefits to be realized by their solution.

b. Point out that in advanced nations human life expectancy spans three generations and each individual may expect to profit personally for many years from the benefits derived from environmental management.

c. Provide experiences which show that collective responsibility is often needed to help resolve problems in which benefits will often be long-range and will accrue to others also.

3. Environmental Appreciation

Each student must acquire a sensitivity to environmental quality, a sense of value, which will guide his perceptions of the environment and motivate him to deal with its problems.

Development

a. Encourage each student to use all his senses as he becomes involved in environmental experiences.

b. Guide and encourage the student in discovering elements in his environment, becoming knowledgeable about its problems, and making value judgements regarding its quality.

c. Utilize teaching techniques which stimulate interest, curiousity, and appreciation.

Developing the Understanding Part of Attitudes

For rational action to occur, the student must have a basic understanding of the biophysical environment, his relationship to it, its associated problems, and a basic understanding of how to help resolve those problems.

Since there is an overwhelming amount of factual information which could be taught concerning the environment and its problems and facts are continually changing and accumulating, a more permanent learning will take place if the student is taught techniques of investigating, evaluating and applying knowledge. Therefore, in the environmental education program, two broad understandings or generalizations seem to provide the framework for those concepts which are necessary to the understanding part of attitudes.

I. The Natural Biophysical Environment

Generalization:

The universe with its energy and matter, including the lithosphere, atmosphere, hydrosphere, and biosphere of the earth, comprises the natural biophysical environment which surrounds man and affects the life and development of all living things.

Encompassed in this broad generalization are the following basic ecological concepts:

1. Natural Ecosystem - Structure and Function

   The natural environment of the earth is essentially a closed and finite system composed of natural ecosystems having:

   a. Structure and components

      Structure is related to the diversity of plants and animals, including producers, consumers, decomposers, and transformers, which utilize matter -- land, water, air, and energy.

   b. Function

      Energy flows and matter cycles through plants and animals at varying rates.

2. Natural Ecosystem - Characteristics, Interrelationships, and Changes

   The characteristics, interrelationships, and changes of the components relate to the functioning of natural ecosystems in a process tending ideally toward a condition of stability:

   a. Characteristics of location, diversity, quantity, and quality of components are involved in the functioning of the natural environment.

   b. Interrelationships between components provide for use and cycling of matter and the use and flow of the sun's energy.

   c. Changes occur continually in both the structure and function of natural ecosystems.

3. Natural Ecosystem Stability

   Stability is a measure of a healthy and lasting environment and results from natural ecosystems possessing characteristics, interrelationships, and changes which reflect:

   a. Structure

      1) a complex network of diverse species with balanced populations

      2) availability of matter

   b. Function

      1) efficient utilization of energy

2) efficient cycling of matter

II. Man and the Biophysical Environment

Generalization:

Man, a biological being, is an integral, inseparable part of an interrelated, interdependent, dynamic system consisting of Man, Culture, and the Biophysical Environment over which he can exert some control.

Encompassed in this broad generalization are the following:

1. Human Environmental Dependency and Needs

Man is the linking component between the natural environment upon which he is dependent and of which he is a steward and the man-made environment which he creates to help provide for physical, psychological, and social needs.

a. Human physical needs are provided for by environmental components which function and possess characteristics related to:

   1) convenience and efficiency

   2) safety and health

   3) durability or lastingness

b. Human psychological needs are met by components which are pleasurable to the senses.

c. Human social needs are met by components which assist people to live in harmony together, to interact, and to gain a measure of individual and group recognition.

2. Human Ecosystem - Structure and Function

Man exercises stewardship and provides for his needs by working on the natural environment through an institutional system of man-to-man relationships and a technological system of man-to-environment relationships to produce and manage the following components of the man-made environment:

a. Production areas

b. Human settlement areas

c. Open space areas

d. Transportation and circulation areas

e. Recreational areas

f. Community service and utility areas

3. Associated Environmental Problems

Environmental problems are often associated with the sizes, concentration, physical characteristics and mental characteristics of the human population and result from the lack of effective individual citizen, institutional, and technological response to existing and future effects of ecological and human demands upon the environment.

Developing Thinking and Behavioral Skills

It is thought that the foregoing concepts when combined with the feelings described earlier form the basis for attitudes and values which may lead to the occurrence of behavior. As stated earlier the desired behavioral outcomes of environmental education relate to a process characterized by the steps outlined below. Students carrying out the process will experience opportunities to develop and change values as well as develop concepts and thinking skills including analysis, synthesis and evaluation.

1. Discovery - Inquiry

   a. Recognizing the structure, components, and processes in natural and human ecosystems.

   b. Investigating these components and processes.

   c. Compiling information in both written and graphic form.

2. Evaluation - Problem Identification

   a. Developing criteria and evaluating how well ecological and human needs are being satisfied by environmental components and processes.

   b. Identifying opportunities for environmental maintenance and improvement.

3. Problem Solving

   a. Selecting - choosing a problem to resolve or improvement project to carry out.

   b. Inquiring - becoming informed about the problem through investigation.

   c. Determining alternative solutions to the problem.

   d. Evaluating solutions and choosing the best one for the situation.

   e. Developing a plan of action.

   g. Evaluating the process and results.

Environmental Education As A Process

Environmental education is viewed as a process in which the student participates in three levels of learning experiences: (1) discovery and inquiry, (2) evaluation and problem identification, and (3) problem solving. Problem identification and problem solving as used here involve not only the recognition, prevention, and resolution of environmental problems but the activities in which students alter and create components in their environment to enhance its function and quality. Students may either act directly on the environment or communicate a concern to others to encourage their participation.

The environmental education learning process emphasizes first-hand experiences focusing on the total environment of the community and immediate surroundings of the student, for example, the school site or neighborhood. The three phases of the process also include classroom experiences.

This approach to environmental education provides an interdisciplinary means of developing values, attitudes, conceptual understandings, critical thinking and behavioral skills. The outcomes of this kind of education may be more specifically stated as behavioral objectives which reflect the three phases of the learning process above:

1. The student will be able to and will continually seek to discover and investigate the components and characteristics of his total environment and the relationship of man with this environment.

2. The student will be able to and will continually develop and apply criteria to evaluate the data related to his total environment and associated human processes and to identify opportunities for maintaining and improving his environment.

3. The student will be able to and will continually participate in selecting and successfully carrying out environmental problem-solving activities involving the prevention and resolution of environmental problems and the alteration or creation of components to enhance the function and quality of the environment.

The process may be carried out by students participating in studies relating to the components of the natural and man-made environment. Figure One suggests how the environmental education process may relate to the study of a natural component of the environment. Figure Two is an outline for the study of walkways and pathways as examples of a man-made environmental component. It should be stressed that it is not particularly important which of the many environmental components is studied nor that all the components be studied. Rather it is the process and associated values, attitudes, concepts, and thinking and behavioral skills which should be emphasized and which will carry over with the student.

The pages which follow Figures One and Two present suggestions related to each of the three phases of the process and include: (1) discovery-inquiry topics related to natural features, man, and human environmental use areas, (2) techniques for environmental evaluation and the identification of opportunities for environmental improvements, and (3) problems and problem-solving activities.

FIGURE 1

THE PROCESS OF

ENVIRONMENTAL EDUCATION

Natural Environment Example: Trees (plants)

Discovery - Inquiry	Evaluation - Problem Identification	Problem Solving
Classroom activities - Learn about the characteristics, interrelationships, changes, and uses of trees through lessons, books and publications, resource people, films, and other instructional aids.	Group or independent development of criteria to assess: 1) how well trees meet ecological needs, e.g., hold soil, prevent erosion, provide homes for wildlife, etc., and 2) how well trees meet human needs, e.g., physical needs, shade, etc.; psychological needs, aesthetics, etc.; social needs, gathering places, etc. Evaluate how well trees meet these needs in a real or hypothetical situation to identify environmental improvement opportunities.	Select a hypothetical problem, e.g., landscape a small park with trees. 1. Investigate the problem - needs, kinds of trees, etc. 2. Develop alternative solutions, plans for different plantings in a variety of locations. 3. Choose a solution after considering effects of each. 4. Develop plan of action - list steps and items needed. 5. Present plan for evaluation by others.
On-site activities - Investigate the trees on the school site and map and describe the kinds present on the site, their locations, sizes, condition, environmental effects, etc.	Develop evaluative criteria as above and assess extent present trees on the school site meet criteria. Identify: 1) existing conditions which need to be corrected - diseased trees, storm damaged trees, etc., 2) conditions which could be enhanced by planting trees, and 3) conditions threatening trees which should be prevented.	Select a tree problem to resolve on the school site; for example, white pine blister rust, etc. 1. Investigate causes, effects. 2. Develop alternative solutions. 3. Choose a solution. 4. Develop a plan of action. 5. Carry out plan. 6. Evaluate results.

FIGURE 2

THE PROCESS OF ENVIRONMENTAL EDUCATION

Man-Made Environment Example:

Walkways and Pathways (transportation-circulation areas)

Discovery - Inquiry	Evaluation - Problem Identification	Problem Solving
Classroom activities - Learn about the kinds, locations, functions, and characteristics of walkways and pathways through lessons, books and publications, resource people, films, and other instructional aids.	Individual and group development of criteria to assess: 1) effects of walkways and pathways on the natural ecosystem - altering drainage patterns, changing microclimate, removing vegetation, etc., and 2) how well walkways and pathways meet human needs: physical - safety, etc., psychological - aesthetics, etc., and social - bringing people together, etc. Evaluate walkways and pathways in a real or hypothetical landscape design plan.	Select a hypothetical problem, e.g., develop a plan for a new pathway. 1. Investigate the problem - needs, kinds of pathways, etc. 2. Develop alternative solutions - routes, kinds of pathways, etc. 3. Choose a solution after considering effects of each. 4. Develop plan of carrying out solution. 5. Present plan for evaluation by others.
On-site activities - Investigate walkways and pathways on the school site or in the community. Map and describe the kinds, locations, characteristics, conditions, and human and environmental effects.	Apply evaluative criteria as suggested above to walkways and pathways being assessed on site. Identify: 1) existing conditions which need to be corrected - erosion, potholes, rerouting, etc., 2) conditions which should be prevented - footwear erosion from overuse, encroachment of vegetation, etc., and 3) conditions which could be enhanced by creating new pathways, signs, etc.	Select a walkway or pathway problem to help resolve on the school site or in the community. 1. Investigate causes and effects. 2. Develop alternative solutions. 3. Choose a solution. 4. Develop a plan of action. 5. Carry out plan. 6. Evaluate results.

ENVIRONMENTAL INVESTIGATION

Areas in the Community and on the School Site to Investigate -

Information gathered by the students can be compiled in written and graphic (map) form. Students can investigate quantitative aspects - location, number, size, etc., and qualitative aspects - characteristics, interrelationships, changes, etc.

Natural Environmental Features and Characteristics -

(Related to the natural components: Land, Water, Air, Plants, Animals, Energy)

1. Land

   - Topography
   - Geology
   - Soils

2. Water

   - Ground water and associated features
     - Aquifers
     - Aquifer recharge areas
   - Surface water and associated features
     - Ocean and coast
       - Estuaries
       - Tidal marshes and flats
       - Beach and dune areas
       - Rocky seashore areas
     - Streams, rivers, and floodplains
     - Lakes and ponds
     - Bogs, marshes, swamps

3. Atmosphere and climate

   - Temperature
   - Air movement
   - Precipitation
   - Air Quality

4. Plant and animal associations

   - Terrestrial habitats
     - Meadows and fields
     - Shrublands
     - Forests and woodlands
     - Transitional habitats
       - Floodplains
       - Upper beaches
       - Ecotones (edges between fields and forests, etc.)
   - Aquatic habitats
     - Saltwater
       - Intertidal
         - Sand beaches
         - Rocky beaches
         - Tidal flats
       - Shallow subtidal areas
         - Bays and inlets
         - Shoals and reefs
     - Brackish water
       - Coastal marshes
       - Estuaries
     - Fresh water
       - Springs
       - Brooks and streams
       - Rivers
       - Swales and marshes
       - Bogs
       - Swamps
       - Ponds
       - Lakes

Man (human populations) and Characteristics

1. Population size and distribution

   Spatial distribution
   Growth trends
   Migration patterns

2. Physical factors

   Age
   Physical health

3. Psychological factors

   Education
   Mental health

4. Social factors

   Historic development
   Social health
   Private organizations

5. Political factors

   Government form
   Government boundaries

6. Economic factors

   Income
   Occupation
   Unemployment
   Housing
   Land ownership

Human Environmental Use Areas and Characteristics -

1. Production Areas

   Aquacultural
   Agricultural
   Forest
   Oil and natural gas withdrawal
   Mineral mining
   Energy production
   Industrial

2. Human Settlement Areas

   Commercial
   Institutional
   Residential
   Historical

3. Open Space Areas

   Buffer zone
   Scenic
   Educational and scientific study

4. Transportation and Circulation Areas

   Streets and highways
   Parking
   Walkways, pathways, and trails
   Airports
   Railways
   Ports, harbors, waterways

5. Recreational Areas

   Playgrounds
   Picnic and camping
   Parks
   Water recreational areas
   Hunting
   Golf, etc.

6. Community Service and Utility Areas

   Power transmission
   Street lighting zones
   Gas supply ways
   Public water supply
   Sewage treatment

6. Community Service and Utility Areas (continued)

   Storm drain
   Sound level
   Solid waste disposal
   Fire control
   Pest and disease control
   Urban tree maintenance

ENVIRONMENTAL EVALUATION AND IDENTIFICATION OF IMPROVEMENT OPPORTUNITI

EVALUATION OF THE NATURAL ENVIRONMENT (composed of the components land, water, air, plants, animals, energy)

1. Do characteristics of location, quantity, quality, and diversity of components contribute to the health and proper functioning of the natural environment?

   Suggested Component Evaluative Questions

   a. Are fertile SOILS available in sufficient amounts to provide for a diversity of plants and animals?

   b. Is WATER available in both quantity and quality to provide for a diversity of plants and animals?

   c. Is AIR of a quality which is not detrimental to plants and animals?

   d. Is a diversity of producer PLANTS and transformers - decomposers - present in balanced populations and in a healthy condition?

   e. Is a diversity of ANIMALS - consumers, transformers, decomposers - present in balanced populations and in a healthy condition?

   f. Is ENERGY present in amount and form - heat, light, sound, chemical, radioactive - which contributes to the health of the environment?

2. Do the links or interrelationships of a component with other components provide for efficient use and cycling of materials and the efficient use of the sun's energy?

   Suggested Component Evaluative Questions

   a. Are SOILS supporting and providing nutrients to plants, holding water, being aerated and providing a home and food for animals?

   b. Is WATER contributing to the productivity of soils, moderating temperature, providing atmospheric moisture, and contributing to the needs of plants and animals?

   c. Is AIR and associated conditions contributing to the productivity of soils, releasing and aerating water, moderating temperature, allowing the passage of sunlight, and contributing to the needs of plants and animals?

   d. Are PLANTS holding soil and providing for the cycling of elements, holding and utilizing water, contributing to air quality and the microclimate, providing for the food and cover needs of a diversity of animals, and providing for the efficient utilization of the sun's energy?

   e. Are ANIMALS providing for the cycling and return of nutrients to the soil and improving the air and water holding capacity of the soil, contributing to the quantity and quality of water

and meeting the needs of plants (pollination, etc.)?

f. Is ENERGY in both amount and form contributing to the stability and quality of soil, water, air, and providing for the needs of plants and animals?

3. Do changes which are occurring show that the component is contributing to the stability of the natural environment?

Suggested Component Evaluative Questions

a. Is SOIL erosion being prevented and the amount and fertility of the soil increasing?

b. Is WATER being distributed and replenished in a normal manner and are its chemical and physical characteristics contributing to the health and quality of the environment?

c. Is AIR, its movement, temperature, and quality, contributing to the health and quality of the environment?

d. Are PLANTS increasing in diversity of species, maintaining healthy balanced populations, utilizing energy efficiently, being recycled and transforming-decomposing matter (normal succession is occurring)?

e. Are ANIMALS increasing in diversity of species, maintaining healthy balanced populations, being recycled and transforming-decomposing matter?

f. Are normal sound and temperature levels being maintained and is sunlight energy available and being increasingly utilized efficiently?

EVALUATION OF THE MAN-MADE ENVIRONMENT

1. Does the man-made component or feature affect the characteristics, interrelationships, and changes outlined above in such a way that it contributes to the health and long-lastingness of the natural environment?

2. Does the man-made component enhance human physical, psychological, and social needs? Man-made components include: production areas, human settlement areas, open-space areas, transportation and circulation areas, recreation areas, and community service and utility areas. In addition to these areas, the design features of each area may also be evaluated. These include:

Natural features
    Areas left in a relatively natural condition
Man-made features
    Surface alterations
    Drainage and water controls
    Plantings
    Buildings and structures
    Site furnishings
    Communicative devices
    Circulation facilities
    Services and utilities

Physical Needs

Is the environmental feature or component functional and does it possess characteristics of:

1. convenience and efficiency,
2. safety and health,
3. durability or lastingness?

Psychological Needs

Is the environmental feature or component and its effects pleasurable to the senses, for example, is it aesthetically pleasing, is there sufficient diversity, etc.?

Social Needs

Does the environmental feature or component assist people to exist in harmony together, to interact, and to gain a measure of individual and group recognition?

Criteria to assist in answering the above evaluative questions may be derived by considering the following:

1. Existing and desired regulations and standards (safety standards, zoning requirements, etc.)
2. Existing and desired objectives of the area or development (to provide for ease of movement, etc.)
3. Unique characteristics of the area of development (one of a kind, historic significance, etc.)
4. Characteristics of those using the area or development (age, health, etc.)
5. Principles of design (unity, harmony, balance, dominance, repetition, contrast)

Kinds of learning opportunities which may be identified from the study and evaluation of the total environment

1. Preventing something detrimental from occurring,
2. Correcting an existing detrimental condition,
3. Adding something which will enhance the function and quality of the environment.

ENVIRONMENTAL PROBLEM-SOLVING AND IMPROVEMENT ACTIVITIES

Problem-solving steps -

1. Inquiring - becoming informed about the problem through investigation.
2. Determining alternative solutions, plans, or designs for the problem.
3. Evaluating the solutions and selecting the best one for the situation.
4. Developing a plan of action.
5. Implementing the plan of action.
6. Evaluating the process and results.

Suggested environmental improvement activities for student involvement -

1. Preventing soil erosion and improving eroded areas.
2. Controlling water quantity and quality.
3. Controlling air pollution.
4. Preventing and controlling plant diseases.
5. Improving wildlife habitats.
6. Rehabilitating mining areas, gravel pits.
7. Preserving historic areas.
8. Acquiring and enhancing open space.
9. Developing pathways, etc.
10. Developing recreational areas.
11. Determining multiple uses of power transmission rights-of-way.
12. Developing drainage controls.
13. Managing litter and solid waste.
14. Improving water quality.
15. Controlling pests.
16. Maintaining urban trees.

CURRICULUM EMPHASIS

Curriculum Considerations

As environmental education has evolved, there have also emerged guidelines or considerations for designing a curriculum. These include the following:

1. Emphasize and relate to local environmental topics, problems, and issues.
2. Stress the development of attitudes, values, and behavioral skills.
3. Develop basic affective concepts including the self concept, social responsibility, and environmental sensitivity.
4. Develop basic cognitive concepts related to the natural and human ecosystems.
5. Involve the learner in the process of discovery-inquiry, evaluation-problem identification, and problem solving.
6. Span the curriculum, kindergarten through grade twelve, providing for the revisiting and reinforcement of concepts.
7. Arrange the curriculum sequence according to developmental and learning patterns.
8. Integrate the program with existing curricula.
9. Link subject areas through interdisciplinary studies and activities.

Expanding the Learner's Environment

At each grade level, K through 6, a study environment may be chosen to help guide the scope and sequence of the program. For grades K-6 the grade-level study environments may be as follows: Grades K-1, the school; Grades 2-3, the neighborhood; Grades 4-5, the community; and Grade 6, the region. At each grade level, the study environment's relationship to the total environment is stressed. At grade levels 7 through 12, the program may work through many subject areas as it attempts to develop feelings, understandings, and skills concerning the environment and its associated problems related to not only the school, neighborhood, community and region, but to the state, nation, and world.

Teaching Organization and Implementation

At each grade level, K through 6, a suggested sequence of implementation may be as follows: (1) grade level in-service workshop for teachers and volunteer field trip guides to familiarize them with the program and the field trip which they will help lead. (The use of citizen volunteers for field trips is important since they allow the class to be broken down into small groups--a key to taking successful field trips in the outdoors. The use of citizens also allows direct community participation and input in the educational process.),

(2) classroom presentation and field trip orientation, (3) field trip in the study environment, and (4) follow-up investigations, evaluations, planning, and conservation activities. Each student should become involved in carrying out at least one environmental improvement activity.

At grade levels 7 through 12 a program should be flexible, involving students in both group and independent activities related to investigation, evaluation, and problem identification, and problem solving. Such activities may be carried out in the classroom and on-site as well as within a subject area or across subject areas

Role of the Resource Center

From an environmental education program's resource center, many instructional materials may be procured for enriching the curriculum. Included may be natural specimens, charts, books, maps, aerial photos, documented inventories, pamphlets, and special field equipment. In conjunction with the center, books and periodicals may be recommended for school libraries. Films, filmstrips, slides, and other audio-visual aids may also be previewed and recommended for purchase by schools.

Role of the School and Community Sites

Good environmental education is related directly to the community by taking students into the environment when appropriate. School sites offer an easily accessible learning environment. This may be important where extended field trips are difficult to arrange. Problems, projects, and other activities can become real and meaningful there. Community sites may also offer many opportunities for first-hand learning especially when school sites have limitations. A program may involve the establishment of a steering committee for school and community site development made up of citizens, administrators, teachers, and students and special consultants or advisors. The committee oversees the development of sites for education use, environmental improvements such as landscaping and beautification, and community use as natural outdoor recreational areas for citizens and visitors. Student involvement should be stressed.

The Role of the Teacher

The teacher plays a key role in developing the type of knowledgeable and concerned active citizen the environmental education program strives to produce. It is the teacher that provides the continuing enthusiasm and guidance as students become exposed to new elements in their environment and participate in valuable environmental improvement activities.

The Role of the Environmental Education Coordinator

The environmental education coordinator, working part-time or full-time in a school system or several school systems, can be a key to implementing an environmental education curriculum emphasis.

Such a person:

1. Can provide continuity and coordination for an inter-disciplinary K-12 program.
2. Will have the background and time to keep abreast of community environmental plans and developments and utilize them for learning experiences.
3. Can provide a direct link between the school and community for mutual cooperation and participation in environmental education learning experiences and projects.
4. Can provide in-service teacher training and cope effectively with continuity problems should they occur because of teacher turnover.
5. Can contribute to meeting adult education needs related to community environmental education.
6. Can become a resource for students engaged in independent and group environmental studies and activities.

The Role of the Environmental Education Committee

A local environmental education committee provides a resource for the coordinator or, where no coordinator exists, provides for the direction and implementation of a program. It is recommended that where an overall school curriculum committee exists that the environmental education committee become a working sub-committee of that organization. The committee should consist of local citizens, community officials, school administrators, teachers, and students. In its early formation, it would be helpful if it could have access to a consultant.

Among the committee's duties are the following:

1. Assist the school in preparing the basic philosophy, goals, program structure, and plan of implementation.
2. Plan and participate in a comprehensive community environmental inventory upon which to base a K-12 environmental education curriculum emphasis.
3. Assist in the selection of and/or planning and developmental phases of school sites as environmental studies and management laboratories as well as environmental interpretive centers for students and adult citizens.
4. Assist in the organization and operation of an environmental education resource center for the school and community.
5. Assist in planning, organizing, and implementing a teacher in-service curriculum workshop for the preparation of K-12 environmental problem-solving units.
6. Assist in providing for evaluation and use of results.
7. Assist in acquainting the community with the environmental education program and seeking community participation.

SUGGESTED FORMAT FOR AN ENVIRONMENTAL EDUCATION TEACHER IN-SERVICE WORKSHOP

The workshop outlined below is designed to: 1. acquaint teachers with the concept of environmental education; 2. introduce them to basic concepts, their application and related teaching strategies; and 3. assist them in the preparation of teaching plans for implementing a K-12 environmental education program. Such a workshop could span several class sessions. Consideration may also be given to making arrangements for recertification credit to be given.

1. Introduction to the concept of environmental education -

   a. The need.
   b. Definition and major goals.
   c. The process of enviromental education.

      Discovery-Inquiry
      Evaluation-Problem Identification
      Problem Solving

   d. Behavioral objectives

2. Presentation of concepts and curriculum structure -

   a. Attitude development concepts.

      1) Affective

         Self Image
         Social Responsibility
         Environmental Sensitivity

      2) Cognitive

         Natural Ecosystem
         Human Ecosystem

   b. Curriculum structure and teaching organization.

      1) Suggested program organization and sequence
      2) Suggested teaching methods
      3. Suggested educational resources

3. Field experience -

   a. Community Inventory
   b. School Site Survey